

Ultrasonic Additive Manufacturing for Capillary Heat Transfer Devices and Integrated Heat Exchangers, Phase II

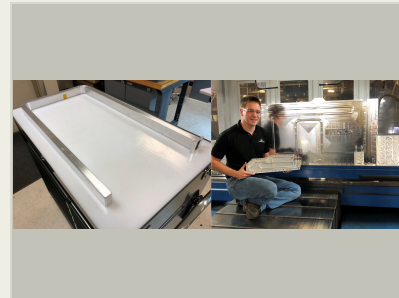
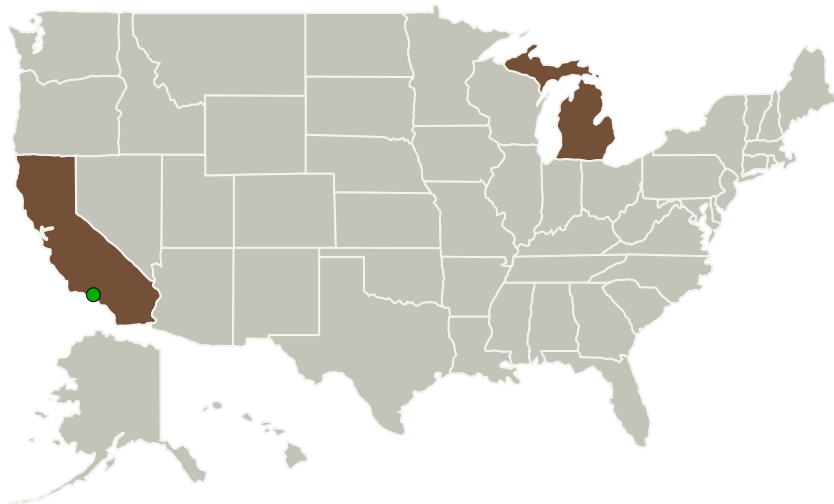
Completed Technology Project (2016 - 2019)



Project Introduction

This Phase II development program will utilize a novel new 3D printing process to produce high performance heat exchangers embedded in CubeSat structures with integrated temperature monitoring sensors. The embedded heat exchanger is part of a multifunctional three dimensional CubeSat structure that will simultaneously accommodate thermal and mechanical loads, and offer radiation protection via multi-material laminates. In particular, Ultrasonic Additive Manufacturing will be used to embed complex cooling channels in a three dimensional part. Success in this program enables low cost production of CubeSat structures with both thermal management and structural integrity excellence. These structures can be applied in low earth orbit devices, where thermal management of small satellites is a principal concern, and also in deep space applications, where radiation shielding is a major problem. The results of this enabling work will provide the engineering design and programmatic information necessary for implementation into a number of NASA space programs, including the planned mission to Europa

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Sheridan Solutions, LLC	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Saline, Michigan
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Michigan
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Project Transitions

**April 2016:** Project Start**December 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139734>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Sheridan Solutions, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John J Sheridan

Co-Investigator:

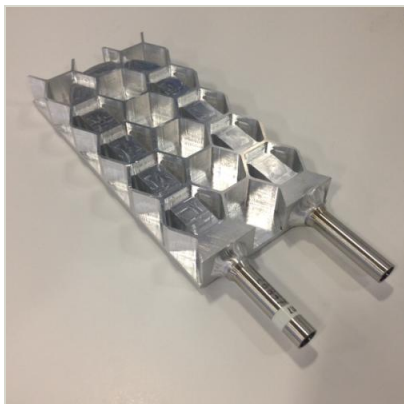
John T Sheridan

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Images



Briefing Chart Image

Ultrasonic Additive Manufacturing for Capillary Heat Transfer Devices and Integrated Heat Exchangers, Phase II

(<https://techport.nasa.gov/image/128349>)



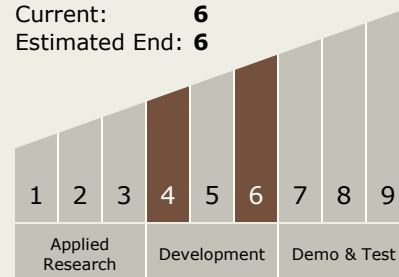
Final Summary Chart Image

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(<https://techport.nasa.gov/image/134294>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.2 Heat Transport

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System